

CHANGE THE WORLD Science & Engineering Careers Fair **Exhibit Descriptions**

3-D Printing (*D.C. Association for Computing Machinery*)

Print your own future with a career in one of the STEM fields. Learn about how 3-D printing is changing our world. Check out this exciting technology and talk to area computing machinery experts!

10 Robot Road Show: FIRST Tech Challenge (*Virginia FIRST*)

It's hands-on fun for all ages! Move FIRST Tech robots around a competition field while negotiating obstacles and solving simple challenges! This exhibit is not only fun, it encompasses skills used in many fields--manufacturing, computer programming, technical trades, information technology, teaching, research, engineering and project management.

Animation, 3-D Printing and Graphic Design in Bio (*National Institute of Allergy and Infectious Diseases, National Institutes of Health*)

Explore the creative side of biological science! Biologists, medical illustrators and biomedical engineers use computer simulations, 3-D animation and digital visual arts to help researchers and others visualize and understand biological processes at the molecular, cellular and organismal levels. View 3-D prints and see a 3-D printer in action! Animate 3-D molecules onscreen! Learn protein "origami."

Astronauts Living and Working in Space (*NASA Education*)

Engage with NASA staff, build Orion models and learn about spacewalks and the tools astronauts use to make repairs outside of the space station. Handle the mock-up spacesuit, sleep restraint, shuttle model and space food. Be sure to ask for takeaway info on NASA careers and programs as well as how to apply for internships, fellowships and scholarships!

Be a Force of Nature! (*National Weather Service*)

Get up close to a weather balloon, but maybe not too close to a static electricity generator, and build a home weather station! Learn all about the science of meteorology and how to keep yourself and your families prepared for and safe from severe weather. If you're interested in becoming a meteorologist, be sure to ask about the different career paths!

Become Part of the Innovation Generation! (*Christopher Columbus Fellowship Foundation*)

Great ideas, discoveries, products and programs start by addressing problems. Meet our group of inspiring and innovative students who used STEM and everyday household items to solve a community problem. Learn how you can become part of the Innovation Generation!

Career Opportunities in STEM Fields (*American Educational Research Association*)

Want to launch a career as an engineer, social scientist, computer scientist or other STEM professional? There's good news--there are a broad range of educational and career pathways available to you. Learn how you can best position yourself to successfully pursue the career of your dreams! Don't miss this opportunity to get some valuable tips and info!

Celebrate Science! (*USA Science & Engineering Festival*)

Learn more about the most compelling, exciting, educational and entertaining national science

festival ever! With more than 1,500 hands-on exhibits, 150 performances and 750 organizations participating, there will be something for everyone. Join in the fun! What will catch your interest?

Computing, Science and Models--Oh, My! (*Computational and Information Systems Laboratory, National Center for Atmospheric Research*)

Learn about the role of supercomputers like the one at the NCAR-Wyoming Supercomputing Center. If you love computers or are curious about how scientists use them, explore this exhibit and learn why supercomputers are essential to studying problems like severe weather! Talk to scientists about how you can be part of the future of supercomputing and atmospheric sciences through a software engineering or computer science career!

Connecting You to the Ocean (*Consortium for Ocean Leadership*)

Dive in and collect data in real time from some of the ocean's unexplored and most challenging depths. Get a "hands-on" look at specialized equipment, including ocean gliders that speed like rockets through the waves, collecting scientific data that will stream on the Internet just around the time today's budding scientists are beginning their careers. Interested in sensing technology and climate science? This is your stop!

Count to 2000! (*Project CRESST, Virginia Commonwealth University*)

Do you know the nutritional and caloric values of the foods and beverages you consume within a 24-hour period? Choose from sample foods to create meals for one day that add up to 2,000 calories. Crafting healthy meal plans with the foods you like is fun and is a skill used daily by those in a variety of health care professions (doctors, nurses, dietitians, sports nutritionists, etc.). Counting to 2000 has never been so much fun!

Crash Investigation (*National Transportation Safety Board*)

Ever wonder how crash investigators figure out what happened? They use math--an essential part of the job! The National Transportation Safety Board will show you how it calculates vehicle deceleration using speed and friction and talk about routinely used equations in accident reconstruction models. Check out the NTSB "go-bag," which contains the tools investigators use at accident scenes. Interested in math, forensic science and a career that will get you out of the office and into the field? Explore this NTSB exhibit!

Dig If You Can! (*Center for Compact and Efficient Fluid Power, Purdue University*)

Interact with a Portable Fluid Power Demonstrator and see how fun and challenging it is to operate a model hydraulic excavator. Learn how excavators can move massive amounts of dirt, how fluids can be used to transfer power and why electrical-mechanical-fluid systems are so important. Fluid power is also found in automobiles, airplanes, robotics, agriculture, flight simulators, amusement park rides, building structures and space applications!

Discover Your World With NOAA (*National Oceanic and Atmospheric Administration*)

Build a buoy! Play "Cool Catch," a memory skills game on Atlantic Ocean diversity. Gain new perspective on water and water stewardship in a demo titled, "A Drop in Your Hand." Be sure to ask about NOAA profiles, which include marine biologist, fisheries scientist, oceanographer, atmospheric scientist, geodesist, cartographer and GIS specialist.

Engineering and Robotics for Learning (*Tufts Center for Engineering Education and Outreach*)

Come and play with new technologies designed to enhance learning of engineering and science. Build a robot out of paper or try a Lego robotics challenge. Talk to mechanical engineers and computer scientists about their work with kids and teachers, designing new ideas for classrooms.

Engineer Your World (*UTeach Engineering, The University of Texas at Austin*)

Making renewable energy affordable, providing access to clean drinking water, engineering better medicines--engineers take on some of the world's biggest challenges. Have you ever wondered how engineers solve such complex problems? Visit this exhibit to analyze the effects of an earthquake on a model high rise and explore ways to create safer buildings. Take part in a design challenge using wood models, a shaker table and data-gathering tools!

EOL: Where Science and Engineering Meet (*Earth Observing Laboratory, National Center for Atmospheric Research*)

Discover radar at the EOL table! Learn about radar reflectivity in a hands-on demonstration. Enjoy videos about radar and other instruments used to study weather and climate around the world. Gain a better understanding of how radar is used to study the atmosphere. Explore what it would be like to be a mechanical, electrical or computer engineer using radar technology!

Explore Seismology! (*Incorporated Research Institutions for Seismology*)

Excited about physics, math and Earth science? Stop by the IRIS exhibit to explore real-time earthquake locations, learn about the dynamic nature of the Earth and examine recent seismic recordings of earthquakes to see how scientists use seismic waves to image the Earth's interior--from the shallow subsurface to the core. Be sure to ask about everything seismologists do--from probing the Earth for fuel sources to studying earthquake hazards.

Exploring Nature Through the Lens of Energy: The Energy Bike Demonstration (*Potomac Overlook Regional Park*)

See a hands-on demonstration of energy, conservation and efficiency principles. Try out our energy bike--a fun way to learn about electricity and efficiency. Pedaling the bike, you will feel how much energy it takes to light up incandescent light bulbs, power hair dryers and more. Through a live animal display, you will also learn how living beings use and transform energy.

Extreme Science! (*George Mason University College of Science*)

Create lightning and make your hair stand up! Travel across the world and learn about calculations across cultures. Engage in some math magic and brain-stimulating games. Enjoy a hands-on, inquiry-based approach to learning about the wonders of the living world and the forensic science field. Talk to scientists, mathematicians, physicists, chemists, biologists, forensic experts and others who can help you learn more about some cool STEM careers.

Fish Get Sick Too! (*U.S. Geological Survey--Leetown Science Center*)

Take a look through microscopes at various preserved fish pathogens and disease agents, practice streaking plates for bacterial isolation (without using bacteria), and learn how to age fish using scales and otoliths. Learn some of the many technologies that are applied to fish health and disease research. Be sure to ask about career paths including wildlife conservation, aquaculture, veterinary specialty in fish disease, microbiology, genetics and others.

Geosciences: The Foundation of the Earth (*Geological Society of America, American Geosciences Institute, American Geophysical Union*)

A career in geoscience can be an amazing life of fieldwork, lab work, computer modeling and interacting with local communities across the nation and around the globe. Geoscience underpins our nation's economic and environmental future and provides the layer of information we use to make decisions about mineral use, energy, natural hazards, water supplies and so much more. Predict lava flow, model an earthquake and make a topographic map!

Girls In Technology (*Women In Technology*)

Learn what programs Girls In Technology has created to support your education and career choices in STEM + Arts & Design = STEAM. The program is launching its first Loudoun County event on November 14th and planning a "Speed Mentoring Program" for late January or February. See how you can GIT connected!

“Give Me an S . . . T . . . E . . . and M!” (*Science Cheerleaders and Sci Starter*)

Meet the Science Cheerleaders--current and former NFL and NBA cheerleaders who are pursuing STEM careers! Learn about their work and professional lives and get involved in their research project to compare microbes on Earth to microbes on the International Space Station!

Ice, Ice, Baby! The Dynamic Polar Glacier (*Center for Remote Sensing of Ice Sheets, University of Kansas*)

Grab some glacier goo and investigate why glaciers are slipping away! Discover how scientists measure ice thickness and how it contributes to sea level rise. Of special interest if you want to be a geologist, geographer, engineer, mathematician or computer science technologist--all careers that can take you to Antarctica or Greenland!

It's Getting Hot in Here (*Center for Essential Science, University of Michigan*)

Explore this interactive exhibit and use an iPod and two apps to collect data on the biodiversity of the local area and the changing surface temperature of the Earth. Talk to scientists about the impact of climate change on organisms including humans. Take part and be an ecologist and a climate scientist!

Language Science--No Lab Coats Required! (*Maryland Language Science Center, University of Maryland*)

Compete with a computer to see who can transcribe speech with more accuracy! Digitize your speech and learn how your brain interprets the sounds you produce! Fight to overcome your native languages while reading words printed in different languages! Ever wonder what makes language science a science? Future computer scientists, electrical engineers and doctors might find the answer particularly interesting!

Let's Get Together: Self Assembly Is All Around You (*Center for Chemical Evolution, Emory University*)

Interesting things can happen when objects assemble themselves together. True for humans--and true for atoms and molecules. Scientists are finding that self-assembly on the atomic and molecular scale was responsible for generating the complexity of form and function needed to get life started on Earth. A great exploratory exhibit for anyone interested in how chemists are answering one of the deepest questions known to man: How did life begin?

LIGO: Searching for Gravitational Waves From Space (*Laser Interferometer Gravitational-Wave Observatory*)

Spend some time with gravitational wave detectors—human ones, that is! Gravitational waves are ripples in space-time first predicted by Albert Einstein in his theory of general relativity. Meet scientists from the Laser Interferometer Gravitational-Wave Observatory (LIGO) who have dedicated their lives to detection of these waves. Experiment with a small LIGO-style interferometer (which measures wave interference) and enjoy other fun activities related to wave behavior. Like physics, astrophysics or mechanical, computer and electrical engineering? This exhibit is for you!

Living Bridges: Learn How Bridges Can Talk! (*Department of Civil Engineering, University of New Hampshire*)

“Bend” steel and investigate the technology that allows bridges to tell us how they are “feeling” and when they are too stressed. Learn about new ways that civil engineers reuse materials to create a sustainable, built environment. Stop by to test your strength and discover how you can help create a sustainable future!

Living Science (*National Institute of Food and Agriculture, U.S. Department of Agriculture/4-H*)

Test your knowledge of electrical circuits, including “squishy” ones made of play dough. See how much power you can generate from a wind turbine that you create. Explore the many careers in food, agriculture, natural resources and human health, where you can apply your STEM interests and skills!

Magical Metal (*Engineering Research Center for Revolutionizing Metallic Biomaterials, North Carolina Agricultural and Technical State University*)

This hands-on demonstration will focus on the advantages of an amazing metal that will provide healing for injuries to the body. Interact with real medical devices and 3-D-printed device prototypes while watching an exciting video that discusses the entire wonderful idea. Who knows? You may become inspired to join the next generation of future biomedical engineers, surgeons and medical doctors!

The Many Faces of Science and Engineering (*Office of Diversity and Inclusion, National Science Foundation*)

See yourself working at the National Science Foundation (NSF) with scientists and engineers from many diverse backgrounds. Through its Pathways programs for students and recent graduates, NSF exposes students to a variety of exciting science and engineering career fields. Visit us on Facebook at US.NSF or tweet us at @NSF. A career at NSF is a passport to the world.

Meet Professional Conservationists (*Smithsonian-Mason School of Conservation*)

Take part in hands-on demonstrations of camera trapping, water quality testing, and using GIS to address conservation problems. Observe different ways scientists collect samples using non-invasive techniques to monitor hormones and stress in captive animals. Learn about careers in conservation, with an emphasis on wildlife and the environment.

No Fuel? No Problem! (*Quantum Energy and Sustainable Solar Technologies Engineering Research Center, Arizona State University*)

Use the power of the sun to race your car to the finish line! After you complete your best solar car design, check out some cool solar tech. This is a great opportunity for future solar engineers to shine! Interested in physics, sustainability, electrical, chemical or mechanical engineering? This booth is for you!

Nursing Science and Neurology: Keeping Your Brain Healthy (*National Institute of Nursing Research, National Institutes of Health*)

Ready to open your mind and explore the brain? In this hands-on exhibit, you can get the “inside story” about brain injuries. Play a word game and learn what helps neurons grow and be protected. Build a container to protect an egg that represents the brain, and test it using a model car and hill. Examine real MRI images of patients with traumatic brain injuries. Check this out especially if you are interested in nursing, medicine, engineering and science!

Physics Playground: Engineering in Motion! (*Children’s Science Center*)

What’s in a physics playground? A wind tunnel, for one thing, a ring-and-hook game and the chance to build your own roller coaster! Enjoy learning important principles of aerodynamics, gravity and

motion and about careers that use physics--there are more than you think! Ask us about a future children's science museum in Northern Virginia, and how youth leaders are inspiring area children in STEM through our Museum Without Walls!

Plants Are Not Optional! (*American Society of Plant Biologists*)

Dig into hands-on activities and meet with plant scientists to learn how plants sustain the entire world's supply of nutritious food, as well as the fuel, fibers and health products you use daily. Discover how research and training in plant biology will help you cultivate a fascinating, fun career based on plants and their uses in nutrition, patent law, science writing, pharmaceuticals, conservation, education and more. Be sure to "harvest" a tattoo, a sprout and other plant-bio treats!

The Power Is Yours! (*Center for Energy Harvesting Materials and Systems, Virginia Tech*)

Devices powered by you! Experience the future of portable and wireless electronic devices. Discover how scientists and engineers in the field of energy harvesting are advancing technology so you'll never change a battery again. Interested in mechanical, electrical or materials engineering? Then check out this exhibit!

Risky Business (*Mixed Methods Research Lab, University of Pennsylvania*)

What do a voice recorder, a map and a Twitter feed have in common? Find out here, as you learn about the range of professional roles and agencies involved in assessing and communicating about environmental health risks. While you're here, you'll learn how to test air quality and have the chance to step into the shoes of an epidemiologist. This visit just might change your answer to the question, "What do you want to be when you grow up?"

Saving Your Best Friend. Woof! Meow! (*Great Falls Animal Hospital/Homeless Animals Rescue Team*)

Love animals? This is the stop for you! Learn about the education and training involved in veterinary medicine, and talk to veterinary professionals about their day-to-day work. Also, meet volunteers for HART, an area organization that rehabilitates and re-homes abused and unwanted dogs and cats.

Science360: Take Science With You! (*National Science Foundation*)

Where does science live 24/7? On your iPad, your phone, your computer! The National Science Foundation presents Science360 – great video, audio, the latest news and more. Science360 goes where you go. See what it's all about...then take it with you!

Science for a Changing World (*U.S. Geological Survey*)

The U.S. Geological Survey is the nation's largest water, Earth, and biological science and civilian mapping agency. Learn about earthquakes while recording your seismic impact as you "jump for science." You will also see how National Capital waterways have changed over time, measure water flow in a flume, and learn how to access and interpret real-time water discharge data from local streams. There's more, including rocks, minerals and a bit about famous building stones of our D.C. monuments!

Science of Innovation (*U.S. Patent and Trademark Office*)

Explore the relationship between invention, innovation and STEM through hands-on activities. See 3-D printers in operation, experiment with designing your own project and even learn about intellectual property considerations. Ask about a variety of career opportunities available at the U.S. Patent and Trademark Office!

Science of the Modern Family (*American Sociological Association*)

As we look at famous families and others more like your own, we'll explore how sociologists collect

data and test hypotheses to better understand the social world. Learn how you can start your own sociological career. You might also win an iPod Shuffle!

The Science of the Super Small (*Museum of Life and Science, Nanoscale Informal Science Education Network*)

Explore the science of the super small! Participate in a variety of hands-on activities that demonstrate the special and unexpected properties found at the nanoscale. Examine tools used by nanoscientists and engineers. See nanomaterials with spectacular promise, and consider the societal implications of new and emerging technologies. Check out thin film solar panels, graphene and the invisibility cloak!

Science on the Giant Screen (*Giant Screen Films/D3D Cinema*)

Meet the researchers who chase storms and discover new dinosaur species. Talk to the filmmakers who bring these larger-than-life science stories to the IMAX screen. Then get behind a 3-D camera yourself and learn about the technology of digital filmmaking. If you're interested in field research and science communication, don't miss this exhibit!

Spark Science Education at NCAR (*National Center for Atmospheric Research*)

At NCAR, scientists don't forecast the weather, they get inside it! Check out the "Spark" booth and fire up your knowledge of the invisible forces behind changes in the power of the atmosphere! Rain, hail, lightning, hurricanes and tornadoes all get a boost from these forces. If you'd like to be a meteorologist, mathematician or atmospheric scientist, take time to explore this exhibit!

STEM at the Ends of the Earth (*Division of Polar Programs, National Science Foundation*)

Try on extreme cold weather gear that scientists and support personnel wear as they work in the polar regions. Learn about albedo, examine Antarctic rocks, scrutinize satellite maps and check out a dinosaur skeleton. If you have an interest in STEM or want to learn about what careers support expeditions in the Arctic or Antarctica, you should spend time at the Polar booth!

Story Pirates (*Story Pirates*)

The Story Pirates pair first-rate comedians with world-class teaching professionals to turn any academic subject into a hands-on, hilarious experience. "It's the best assembly I've seen in 22 years of teaching," said one teacher. "I can honestly say that the Story Pirates are the most popular, even beloved, group we have worked with," said another. "The children, the administration, the teachers and the parents all rave about the troupe." Don't miss it!

Strawberry DNA Extraction (*National Human Genome Research Institute, National Institutes of Health*)

Did you know you can extract DNA from strawberries using common reagents found in homes? A simple, quick procedure isolates DNA, which contains all the genetic information that defines strawberries. Scientists researching diverse topics, physicians caring for patients and forensic pathologists chasing criminals isolate DNA and use genetic information in their work. Strawberries and DNA extraction – an interesting combination!

Sublimation Anyone? (*NOVA's SySTEMic Solutions*)

See sublimation happen before your eyes! Watch a substance go from solid to gas--skipping the liquid state. Use dishwashing detergent to observe how the gas from dry ice is heavier than air, causing bubbles to flow to the floor instead of float to the ceiling. Interested in chemical engineering? Don't miss this exhibit!

Tackling the World's Toughest Challenges. Powerful Answers. (*Verizon Wireless*)

At Verizon, we believe in the power of technology to solve just about anything. See how Verizon's Innovation Center is putting robots in the classroom, improving survival chances, being more sustainable, and creating powerful answers.

Understanding Me (*Project CRESST, Virginia Commonwealth University*)

Are you a "supertaster?" Explore the link between your genetics and the foods you like to eat, to understand why you prefer certain foods and not others. Discover how genetic researchers and nutritionists are learning about how we choose our food.

WaterSim: Exploring Urban Water Resources Management (*ASU Decision Center for a Desert City*)

WaterSim is a simulation model researchers use to explore how climate change, population and public policy interact to affect water sustainability. Fields and subjects related to this critical work? Hydrology, engineering, public policy, engineering, wastewater treatment, just to name a few!

We Make the Measurements! (*National Institute of Standards and Technology*)

You may think that a gallon is a gallon and a yard is a yard, but it wasn't always the case. Thanks to the work of NIST, today we have consistent measurements and standards, including the official U.S. time based on the NIST atomic clock in Boulder, Colo. See hands-on demonstrations and help do the measurements! Talk to the measurement scientists and engineers who routinely use math, physics and chemistry in their work, in subjects such as sound, light and lasers, vibration, mass and force, acceleration and electronics.

What Is Your Name? The Device Can Tell (*West Virginia University*) Say your name to the Kinect device just once, and the device will recognize your face afterward, even if you move your head, smile or make a funny face. This demonstration will be of special interest to students interested in computer science!

What Small Fruit Flies Can Tell Us About Our Big Brain (*University of Missouri-Columbia*) How often have you tried to swat a fly but failed? What makes a tiny bug so smart? Of course, it's the fly's brain. (Yes, flies have brains!) Spend some time with fruit flies, watch mutant flies become temporarily paralyzed, and discover how a fly's nervous system works like ours. If biology turns you on, this is the booth to explore!

WrestleBrainia3000 (*Center for Sensorimotor Neural Engineering, University of Washington*)

WrestleBrainia3000 is a two-player game that uses electrical signals from players' muscles. Brain beats brawn in this arm wrestling game where neuromuscular-signal strength, instead of physical strength, determines the winner. Participants get visual feedback about their muscle firing patterns and learn about the nervous system and neural engineering. Interested in neuroscience, electrical engineering, rehabilitation medicine or neural engineering? Give your brain a workout!